

AMENDMENTS TO THE CLAIMS

Claim 1 (Currently Amended): A process for producing a silica-based dielectric film in a semiconductor device, the process comprising

applying directly on a semiconductor device a film comprising at least one siloxane compound; and

irradiating the film comprising at least one siloxane compound with electron beams at an irradiation dose of from 1 to 200 $\mu\text{C}/\text{cm}^2$ to thereby react the siloxane compound throughout the film and generate silicon carbide bonds represented by Si-C-Si while maintaining the dielectric constant of the film at a value of 3 or lower, wherein

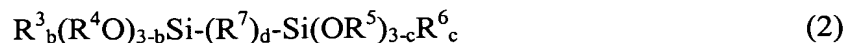
the siloxane compound is a product obtained from at least one compound selected from the group consisting of

compounds represented by the following formula (1):



where R^1 represents a monovalent organic group or a hydrogen atom; R^2 represents a monovalent organic group; and a is an integer of 0 to 2, and

compounds represented by the following formula (2):



where R^3 , R^4 , R^5 , and R^6 may be the same or different and each represents a monovalent organic group; b and c may be the same or different and each is an integer of 0 to 2; R^7 represents an oxygen atom or a group represented by $-(\text{CH}_2)_n-$, where n is 1 to 6; and d is 0 or 1.

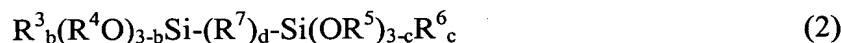
Claim 2 (Original): The process as claimed in claim 1, wherein the silica-based film has a dielectric constant of 2.8 or lower.

Claim 3 (Previously Presented) The process as claimed in claim 1, wherein the siloxane compound is a product of the hydrolysis and/or condensation of at least one compound selected from the group consisting of compounds represented by the following formula (1):



where R^1 represents a monovalent organic group or a hydrogen atom; R^2 represents a monovalent organic group; and a is an integer of 0 to 2, and

compounds represented by the following formula (2):



where R^3 , R^4 , R^5 , and R^6 may be the same or different and each represents a monovalent organic group; b and c may be the same or different and each is an integer of 0 to 2; R^7 represents an oxygen atom or a group represented by $-(CH_2)_n-$, where n is 1 to 6; and d is 0 or 1.

Claim 4 (Canceled)

Claim 5 (Previously Presented): The process as claimed in claim 1, wherein the film comprising at least one siloxane compound has a thickness of from 0.05 to 3 μm .

Claim 6 (Previously Presented): The process as claimed in claim 1, wherein the electron beam irradiation is conducted at an energy of from 0.1 to 50 keV.

Claim 7 (Original): The process as claimed in claim 1, wherein the electron beam irradiation is conducted at 25 to 500°C.

Claim 8 (Original): The process as claimed in claim 1, wherein the electron beam irradiation is conducted in an atmosphere having an oxygen concentration of 10,000 ppm or lower.

Claim 9 (Original): The process as claimed in claim 1, wherein the electron beam irradiation is conducted in an inert gas atmosphere.

Claim 10 (Original): The process as claimed in claim 1, wherein the electron beam irradiation is conducted at 133.3 Pa or lower.

Claim 11 (Previously Presented): The process as claimed in claim 1, wherein the film comprising at least one siloxane compound is heat-cured at 300 to 500°C before being subjected to the electron beam irradiation.

Claim 12 (Currently Amended): A silica-based dielectric film in a semiconductor device obtained by the process as claimed in claim 1.

Claim 13 (Currently Amended): The silica-based dielectric film in a semiconductor device as claimed in claim 12, ~~which~~ wherein the silica-based film has a carbon content of from 5 to 17% by mole.

Claim 14 (Currently Amended): ~~A low-dielectric film comprising the~~ The silica-based dielectric film in a semiconductor device as claimed in claim 12, wherein the silica-based film is a low-dielectric film.

Claims 15-16 (Canceled)

Claim 17 (Previously Presented): The process as claimed in claim 1, wherein the electron beam irradiation is conducted in an atmosphere having an oxygen concentration of 1,000 ppm or lower.

Claim 18 (Canceled)

Claim 19 (Previously Presented): The process as claimed in claim 1, wherein the semiconductor device comprises at least one member of the group consisting of silicon, SiO₂ and SiN.

Claim 20 (Canceled)

SUPPORT FOR THE AMENDMENT

This Amendment cancels Claims 18 and 20; and amends Claims 1 and 12-14.

Support for the amendments is found in the specification and claims as originally filed. In particular, support for the amendments is found in the specification at least at page 1, lines 8-9, and page 3, lines 3-4 ("dielectric film in semiconductor devices"). No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1-3, 5-14, 17 and 19 will be pending in this application. Claim 1 is independent.

REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

Claim 18 is rejected under 35 U.S.C. §112, first paragraph. To obviate the rejection, Claim 18 is canceled.

Claims 1-3, 5-14 and 17-20 are objected to. Applicants thank the Examiner for the indication that Claims 1-3, 5-14, 17 and 19 would be allowable if rewritten to overcome the objections set forth in the Office Action. Office Action at page 10, section 13. To obviate the objections, Claims 1 and 12-14 are amended and Claim 20 is canceled.

Claim 20 is rejected under 35 U.S.C. § 102(e) or, in the alternative, under 35 U.S.C. § 103(a) over U.S. Patent No. 6,395,607 ("Chung"). To obviate the rejection, Claim 20 is canceled.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Application No. 09/770,289
Reply to Office Action of June 30, 2004.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon

Customer Number

22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)
CPU/rac



Corwin P. Umbach, Ph.D.
Registration No. 40,211